Name: ____

January 28^{th}, 2015.
Math 2401; Sections K1, K2, K3.
Georgia Institute of Technology
Exam 1

I commit to uphold the ideals of honor and integrity by refusing to betray the trust bestowed upon me as a member of the Georgia Tech community. By signing my name below I pledge that I have neither given nor received help on this exam.

Pledged: ____

Problem	Possible Score	Earned Score
1	20	
2	18	
3	14	
4	17	
5	10	
6	21	
Total	100	

Remember that you must SHOW YOUR WORK to receive credit!

Good luck!

1. [20 pts.] Consider the points in space:

$$P(1,2,0); \quad Q(3,1,2); \quad R(-2,0,1).$$

a). [6 pts.] Express the vectors $\overrightarrow{PQ}$ and $\overrightarrow{PR}$ in standard component form.

b). [7 pts.] Find:

$$\overrightarrow{PQ} \times \overrightarrow{PR}.$$

c). [7 pts.] Find an equation for the plane determined by the points P, Q and R. You do not need to simplify.

2. [18 pts.] Find parametric equations for the line that is tangent to the curve:

$$\vec{r}(t) = (2\sin(t))\,\vec{i} + \left(t^4 - 5\cos(t)\right)\vec{j} + \left(4e^{2t}\right)\vec{k},$$

at the point on the curve where $t = 0$.

3. [14 pts.] Consider the vectors:

$$\vec{u} = \langle 1, 1, 1 \rangle \,,$$
$$\vec{v} = \langle 2, 1, 0 \rangle \,.$$

a). [7 pts.] Find the dot product $\vec{u} \cdot \vec{v}$.

b). [7 pts.] Find the angle θ between $\vec{u}$ and $\vec{v}$. Give an exact answer.

4. [17 pts.] Given that:

$$\frac{d\vec{r}}{dt} = \left(6\sqrt{t+1}\right)\vec{\imath} + \left(e^{-t}\right)\vec{\jmath} + \left(\frac{1}{t+1}\right)\vec{k},$$

$$\vec{r}(0) = \vec{k},$$

find $\vec{r}(t)$.

5. [10 pts.] Find the length of the curve:

$$\vec{r}(t) = (t\cos(t))\,\vec{i} + (t\sin(t))\,\vec{j} + \left(\frac{2\sqrt{2}}{3}t^{3/2}\right)\vec{k},$$

from the point $(0,0,0)$ to the point $(-\pi, 0, \frac{2\sqrt{2}}{3}\pi^{3/2})$.

6. [21 pts.] Given the curve:

$$\vec{r}(t) = \langle t,\, 2\sin(t),\, 2\cos(t) \rangle\,,$$

find:
a). [7 pts.] The unit tangent vector $\vec{T}(t)$.

b). [7 pts.] The unit normal vector $\vec{N}(t)$.

c). [7 pts.] The unit binormal vector $\vec{B}(t)$. (You can use the back of this page for $\vec{B}$).

Name: ____

February 18$^{\text{th}}$, 2015.
Math 2401; Sections K1, K2, K3.
Georgia Institute of Technology
Exam 2

I commit to uphold the ideals of honor and integrity by refusing to betray the trust bestowed upon me as a member of the Georgia Tech community. By signing my name below I pledge that I have neither given nor received help on this exam.

Pledged: ____

Problem	Possible Score	Earned Score
1	18	
2	16	
3	17	
4	16	
5	18	
6	15	
Total	100	

Remember that you must SHOW YOUR WORK to receive credit!

Good luck!

1. (a). [9 points] Find the limit, or show that it does not exist:

$$\lim_{(x,y)\to(0,0)} \frac{3x^2}{x^2+2y^2}.$$

(b). [9 points] Find the limit, or show that it does not exist:

$$\lim_{(x,y)\to(4,1)} \frac{\sqrt{x}-2\sqrt{y}}{x-4y}.$$